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AN INTERPRETIVE MANUAL

FOR THE DUKE UNIVERSITY PLACEMENT TESTING PROGRAM

Henry Weitz

DUKE UNIVERSITY

BUREAU OF TESTING AND GUIDANCE

AUGUST 1960

U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
Office of Education

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I. INTRODUCTION

Because of changes in the Placement Testing Program and because of the significant improvement in the test-measured abilities of freshmen entering Duke University, it becomes necessary to provide a new interpretive manual for the Placement Testing Program. The present manual replaces the Duke University Placement Testing Program Interpretive Manual of July 1956. The major purposes of the present manual are: (1) to describe the changes which have taken place in the Placement Testing Program, (2) to provide new and more appropriate test norms, and (3) to indicate uses which may be made of the test scores.

II. THE PLACEMENT TESTING PROGRAM

In 1959, the Cooperative English Test, Mechanics of Expression, was dropped from the Placement Test Program. This was done because it was not being used for placement in English courses and sections as had originally been intended. The major changes in the program of Freshmen English instruction made it unnecessary to identify students who required the sub-Freshman English course while the introduction of the College Entrance Examination Board advanced placement tests identified, before admission, those students who could be placed in advanced English courses. Hence the test was discontinued.

Since 1957, most of the students entering the University have presented as part of their admissions credentials the College Entrance Examination Board Scholastic Aptitude Test (hereinafter referred to as the S.A.T.). The S.A.T. measures the student's verbal and mathematical reasoning skill and correlates highly with the sub-tests of the American Council on Education Psychological Examination for College Freshmen (hereinafter referred to as the A.C.E.). Since the S.A.T. measures substantially the same traits as the A.C.E., and since most Duke freshmen have already taken the former, it was felt to be a duplication of testing effort to continue administering the A.C.E. as part of the Placement Testing

Program. Therefore, beginning in 1960, the S.A.T. scores will be reported in place of the A.C.E. scores and administration of the latter will be discontinued.

Beginning in September, 1960, the following tests will be used in the Placement Testing Program: The S.A.T., the Cooperative Reading Test, the Duke Mathematical Department Placement Test, and the Cooperative French, Spanish, German, and Latin foreign language tests. These tests are described below.

A. Scholastic Aptitude

The College Entrance Examination Board Scholastic Aptitude Test is used to measure the student's ability to do college work. It is a kind of general intelligence test designed specifically to measure aptitude for academic training. This examination can help answer such questions as: Does the student have the general academic ability to learn the kinds of things taught in college? Can he adapt to novel academic situations? Can he think verbally and quantitatively? In short, can he be expected to perform those activities required of a college student with sufficient facility to earn passing grades?

Although the test gives a rough measure of "mental alertness", it should not be taken so seriously as to exclude other evidence of talent and intelligence in individual cases. Scores obtained from this test are most useful in predicting a student's academic performance when they are considered in conjunction with his high school record and other evidences of ability such as his scores on achievement examinations.

The S.A.T. yields two scores, a verbal and a mathematical score. The former indicates the student's ability to deal with verbal concepts, to read, to interpret, and to reason with verbal symbols; the latter indicates the student's ability to deal with quantitative and scientific data.

At the request of some members of the faculty and staff of the University, a combined verbal and mathematical S.A.T. score will be provided. This is simply the sum of the two scores. While it is not certain, as yet, just what this combined score measures, we can anticipate that it will correlate

rather well with general academic performance. Hence it is likely to have about the same meaning as the total A.C.E. score had in estimating academic ability. Norms for the verbal, mathematical, and combined S.A.T. scores are provided in this manual.

The correlations between the S.A.T. scores and the A.C.E. scores are reported in Table 1. The relatively high correlation between these

Table 1

Correlations Among S.A.T. and A.C.E. Scores

(Based upon the scores of 3057 Trinity College, Woman's College, and College of Engineering students who entered Duke in 1957 - 59.)

	ACE Total	SAT V	SAT M	ACE L	ACE Q
SAT V + M	<u>.7285</u>	*	*	.6624	.5522
ACE Total		.7096	.5173	*	*
SAT V			.4235	<u>.7710</u>	.3167
SAT M				.3413	<u>.6191</u>
ACE L					.4155

* These correlations would have no meaning since the sub-test score is part of the total score.

Underlined scores are the ones which are most important to the discussion.

scores suggests that they are measuring substantially the same traits. Of particular importance to this point are the correlations underlined in Table 1: the combined S.A.T. M and V Score correlates .7285 with the total A.C.E.; the mathematical and quantitative scores correlate .6191; and the verbal and linguistic scores correlate .7710. It might be noted in passing that the mathematical S.A.T. and the quantitative A.C.E. scores do not show as high a correlation as the other measures. This may be

due to the fact that about one-third of the A.C.E. Q-score is made up of space visualization items and hence may not be as good a measure of quantitative reasoning as the S.A.T. M-score.

B. Reading Comprehension

The Cooperative English Test C-2: Reading Comprehension is used to measure the student's reading skills. This test yields three part scores and a total score. Measures of vocabulary, reading speed, level of comprehension, and total reading skill are obtained on this test.

Sixty multiple response definition questions sample the student's vocabulary. Ninety questions based upon a variety of short reading selections sample the student's reading comprehension. The number of items completed correctly within a time limit gives the speed score. The total reading score is a combination of these scores.

C. Mathematics

The Duke University Department of Mathematics Placement Test is used as a measure of the student's computational and mathematical reasoning skill. The test consists of ten arithmetic problems, thirty algebra problems, and ten trigonometry problems. The student is required to carry out all computations and record his answers. This is the only test in the battery which is not a multiple choice examination.

D. Languages

Foreign language mastery is measured by the appropriate Cooperative foreign language test. All students, except engineers, who studied a foreign language in high school and who plan to continue that language in college are required to take the examination in that language.

These tests are composed of multiple response items designed to measure a student's skill in foreign language reading, vocabulary, and grammar.

III. INTERPRETATION OF TEST SCORES

None of the Placement Test scores---and this is probably true for any test score---represents a measure of native endowment or innate ability. At best, tests can only sample behavior. In carefully constructed tests, the sample of behavior is fairly representative of larger areas of behavior. Since behavior results from the influences of training, experience, and thought upon the individual's physical and nervous structure, new experiences, training, and contemplation will revise a student's behavior and, consequently, his test scores. These scores should, therefore, be thought of as measuring behavior at a given time, in a particular situation, and under a particular set of motivating circumstances. No student should be labeled an irrevocable dullard because of a low scholastic aptitude score nor a mathematical moron because of his inability to match his classmates on a mathematics test.

Estimating human talents and achievements is a highly complex activity. The length of a piece of lumber can be estimated with a high degree of accuracy by the use of a carefully calibrated rule. Certain factors such as temperature, humidity, and the skill of the observer will influence the accuracy of measurement, yet these are as nothing compared to the chances for error in measuring the potential academic effectiveness of a jittery Freshman with an instrument calibrated against hundreds of other equally jittery Freshmen. To temperature and humidity must be added the color of the student's hair in the row ahead, the quality of the examiner's voice, and the emotional atmosphere of the testing room. In addition, the whimsies of test scoring machinery or human scorers present further complications. These, and other factors which will come readily to mind, limit the accuracy of measurement. Yet with all of these inadequacies, we can learn more about a student's potentialities in a shorter space of time by the use of tests than in almost any other way. In interpreting any test score, it is desirable to keep these error-producing distractions in mind.

Low scores may be a measure of the distractions suffered by the student. High scores, on the other hand, generally reflect a student's real ability, for short of cheating (and it is fairly difficult to cheat

on these tests), a student's test scores can be high only because he knows the answers.

A. How the Test Score is Derived

With the exception of the mathematics test, all Placement Tests are scored by machine. The Mathematics Placement Test is scored by specially instructed and supervised upperclassmen. The S.A.T. is administered and scored by the Educational Testing Service and the scores are reported by them to Duke.

The score derived from either machine or hand scoring is usually the number of correct responses or the number of correct responses reduced by some appropriate proportion of incorrect responses. This latter method of scoring is applied to the reading and foreign language tests and is designed to correct the score for guessing. The formula for this correction is $S = R - W/N-1$ in which S = the score, R = the number of correct answers, W = the number of incorrect answers and N = the number of alternatives in each multiple-choice item.

In the case of the reading and foreign language tests, the obtained score is further refined into a scaled score which has a linear relationship to the original score but which, in addition, relates the scaled score to the average score of the original standardization group and to the variability of the scores within that group. The formula for these standard scores is:

$$S = 50 + 10\ \frac{X-M}{SD}$$

in which S = the scaled score, X = the raw score being converted, M = the mean, and the SD = the standard deviation of the standardization population.

The S.A.T. scores which are reported by the Educational Testing Service are scaled scores derived as indicated in the formula above with the exception that the constant 50 is changed to 500 and the constant 10 to 100. It is important to note that the standardization population for a set of S.A.T. scores is generally the group which took the test during the preceding year. If we apply this formula, we see that a score of 500 is equal to the mean score of students who took the test during the previous year.

B. How Stanine Scores are Derived

A raw score tells the examiner very little about the level of a student's performance unless he can relate the score to some standard of performance. Even a scaled score has little meaning unless the standardization population from which it is derived can be clearly defined. In the case of the Placement Tests for which scaled scores are available, little meaning can be attached for the standardization population differs for each test. Furthermore, as it turned out, none of the standardization populations used in establishing the national test norms proved to be appropriate for the groups of students admitted to Duke University. Hence it became necessary to develop a set of local norms based upon our own students.

The Duke stanine scores developed for the Placement Tests relate any student's score to the average performance of Duke students, thus providing, at a glance, an evaluation of a given student's abilities compared with all other Duke students.

The stanine (standard nine) system of converting raw scores to a standard scale breaks up any distribution of scores into nine segments. Each segment of the distribution of scores is one-half a standard deviation in length.[1] These segments of the distribution are numbered from 1 to 9 with 9 being the highest possible stanine score and 1 the lowest. Stanine 5 is in the middle of the distribution and extends one-quarter of a standard deviation on either side of the mean score of the distribution.

Thus a student who earns a stanine 5 score on a test may be said to have an average score, since his score is within one-quarter of a standard deviation from the mean score of his group. A student whose stanine score is 8, say, has a score which is between 1.25 and 1.75 standard deviations above the mean. In a normal distribution, 78 per cent

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1. The standard deviation is a measure of the variability in a distribution of test scores. It indicates the average difference between the mean score and all other scores in the distribution. Because a few scores may be very high or very low, stanines 1 and 9 are theroretically larger than one-half of a standard deviation. Regardless of this fact, however, only 4 per cent of all scores in a normal distribution of scores fall in stanine 1 or 9, and for all practical purposes we may realistically consider all stanines one-half standard deviation in size.

of the scores fall below this point. Table 4 on page 12 shows the stanines, the percentage of scores which fall below each stanine and the raw score limits for each stanine for each of the Placement Tests.

The Duke stanine system of converting test scores makes it possible not only to compare a student's test score with those of his classmates, but also makes it possible to compare a student's performance on one test with his performance on another. This can only be done when all test scores are based upon the same kinds of norms derived from the same standardization population.

C. Comparison of the 1951-55 group with the 1957-59 group

Ideally, a stanine score would relate a given student's score to the scores of his classmates. Because of the fact that Placement Test scores are required within twenty-four hours or less after the tests are administered while it may take a week or more to prepare a set of stanine norms, it is not possible to provide a new set of norms for each class. In the past, stanine norms were prepared for several entering classes combined and applied to subsequent entering classes. In general, this does no particular violence to the meaning of a test score so long as the test measured abilities of students admitted to the University remain fairly consistent from year to year.

The 1956 Placement Test stanines were based upon the test performance of approximately 5000 students who entered Duke between 1951 and 1955. Small improvements in the student's performance during the next year or so did not markedly change the meaning of the stanine scores. During the last several years, however, the students entering Duke have improved so markedly that the stanine scores no longer have the same meaning.

For example: according to the way in which the stanine scores are derived, we would expect a student whose scores were average to have a stanine score of 5 on all of his tests. If, however, we take the average scores on all tests of students who entered in 1959 and convert them to 1956 stanines we find that every 1959 average Placement Test score is in the 6th stanine on the basis of 1956 norms. This would lead one to expect

the average 1959 entrant to perform above average. As a matter of fact, however, he is competing with a much more able group of students than those on whom the norms were based.

The Placement Test performance of the 1951-1955 entrants was compared with that of the 1957-1959 entrants. This comparison is tabulated in Table 2.

Table 2

Test Performance of Duke Students
Who Entered in 1951-55 and 1957-59

TEST	1951-55 (N=4735)[a]		1957-59 (N=3057)[b]		Difference
	M	SD	M	SD	
A.C.E.					
Quantitative	46.04	9.02	49.43	8.09	3.39 *
Linguistic	74.78	15.34	79.34	14.25	4.56 *
Total	120.82	21.25	128.77	19.09	7.95 *
READING	61.38	9.01	64.95	8.84	3.57 *
MATHEMATICS	20.76	8.23	26.06	8.20	5.30 *
CEEB S.A.T.					
Verbal		c	544.44	88.61	
Mathematical		c	571.20	86.39	
Combined		c	1115.64	149.95	

a. 1951-55 includes all entrants to Trinity College, Woman's College, College of Engineering, and School of Nursing.

b. 1957-59 includes only entrants to Trinity College, Woman's College, and the College of Engineering who took both the Placement Tests and CEEB tests.

c. Not available for 1951-55.

* The difference is statistically significant ($P < .01$).

As can be seen in Table 2, all differences are in favor of the 1957-1959 group and all are statistically significant. (That is, a difference

as large as the one found would occur by chance alone in less than one out of one hundred similar samples.) We may, therefore, conclude that the freshmen who entered Duke in the recent past and who are likely to enter in the near future are sufficiently different from the 1956 norm group to require a new set of stanine norms in order that a more meaningful evaluation of their abilities may be made.

D. The 1960 Stanine Norms

The Placement Test stanines for the S. A. T., Reading and Mathematics Tests are based upon the test performance of 3057 freshmen who entered Trinity College, Woman's College, and the College of Engineering in the fall terms of 1957-59 inclusive and who took the S. A. T. as well as the Placement Tests. This represented about 97 per cent of the students who entered these colleges during these years. Table 3 below reports the number of students by college and year included in the norms.

Table 3

Students Included in the 1960 Stanine Norms

COLLEGE	Year Admitted			
	1957	1958	1959	Total
Trinity	439	507	562	1508
Woman's	376	326	345	1047
Engineering	153	174	175	502
Total	968	1007	1082	3057

Entrants to the School of Nursing were not included because S. A. T. scores were not available for them. A sample study showed, however, that the inclusion of these students in the norms for which data were available would have had little or no effect on the scores partly because their means were so close to the all-University mean and partly because their numbers were so relatively small as to have little influence on the totals.

No new stanine norms for the foreign language test were computed. In a previous study it was found that although considerable improvement was noted from year to year in the scholastic aptitude, reading, and mathematics test scores, no similar improvement was noted in the foreign language performance. Hence it was decided to retain the 1956 norms for these tests.

Table 4 provides a means of converting scores of the S. A. T., Mathematics and reading to stanines based upon the 1957-1959 groups. (See Table 4 on page 12.) For any test listed in the left-hand column, look up the student's score in the body of the table. At the head of the column in which his score is found, is the stanine equivalent for that score. The first row in the foot of the table (below the second double line) gives the verbal description applicable to each stanine. The second row indicates the percentage of scores in a normal distribution which fall in each stanine. The third row simply cumulates these percentages and, therefore gives the percentile rank for the lowest score in each stanine.

Table 5 provides the stanine equivalents for foreign language test scores. This table gives the 1956 stanine scores. (See Table 5 on page 13.)

Table 4.

1960 Stanine Equivalents For Placement Test Scores

(Based on the Test Performance of 3057 Freshmen Who Entered Duke in the Fall Terms of 1957 - 1959.)

TEST	RANGE OF SCORES FOR EACH STANINE								
	1	2	3	4	5	6	7	8	9
CEEB SAT									
Verbal	389+Less	390-433	434-477	478-522	523-566	567-610	611-655	656-699	700+
Mathematical	420+Less	421-463	464-506	507-550	551-593	594-635	636-678	679-722	723+
Combined	853+Less	854-928	929-1003	1004-1078	1079-1153	1154-1128	1229-1303	1304-1378	1379+
READING									
Vocabulary	47+Less	48-51	52-55	56-59	60-64	65-68	69-72	73-76	77+
Speed	47+Less	48-52	53-57	58-63	64-69	70-74	75-80	81-85	86+
Devel.	49+Less	50-53	54-57	58-62	63-66	67-70	71-74	75-78	79+
Total	49+Less	50-53	54-58	59-62	63-67	68-71	72-76	77-80	81+
MATHEMATICS	11+Less	12-15	16-19	20-24	25-28	29-32	33-36	37-40	41+
Verbal Description Applicable to Stanine	Very low	Low		Low Average	Average	High Average	High		Superior
Percentages of Scores in Each Stanine	4	7	11	18	20	18	11	7	4
Cumulative Percentages	4	11	22	40	60	78	89	96	

Table 5.

Stanine Equivalents for Foreign Language Placement Test

(Based upon the Scores of the 1951-1955 Entrants.)

TEST	RANGE OF SCORES FOR EACH STANINE								
	1	2	3	4	5	6	7	8	9
FRENCH	34+ Less	35-41	42-48	49-55	56-62	63-69	70-75	76-82	83+
GERMAN	29+ Less	30-36	37-42	43-49	50-55	56-62	63-68	69-75	76+
SPANISH	25+ Less	26-32	33-40	41-47	48-54	55-62	63-69	70-77	78+
LATIN	40+ Less	41-45	46-50	51-55	56-60	61-65	66-70	71-75	76+

Verbal Description Applicable To Stanine	Very Low	Low		Low Average	Average	High Average	High		Superior
Percentages of Scores in Each Stanine	4	7	11	18	20	18	11	7	4
Cumulative Percentages	4	11	22	40	60	78	89	96	

E. Comparison with National Norms.

Table 6 below compares with the mean scores of the 1957-1959 (the 1960 norm group) with the national norm groups. The average scores of the 1960 norm group ranged from the 67th percentile to the 81st percentile when compared with the national populations. In general, then, we may say that the average student entering Duke now is better, with respect to these test measured abilities, than two thirds to three quarters of the students entering colleges across the country.

Table 6.

National Percentile Rank Equivalents For
1957 - 59 Mean Placement Test Scores

TEST	1957-59 Mean Score	National Percentile Rank
A. C. E.		
Quantitative	49.43	79
Linguistic	79.34	77
Total	128.77	81
READING		
Vocabulary	62.32	70
Speed	66.49	75
Level	64.02	73
Total	64.95	75
MATHEMATICS	26.06	*
CEEB S.A.T.		
Verbal	544.44	67
Mathematical	571.20	76
Combined	1115.64	*

* Data not available

IV. USE OF PLACEMENT TESTS IN COURSE ASSIGNMENTS

Each department using the Placement Test for assigning students to courses determines its own criteria for making these assignments. The general procedure followed by each department has been to determine "cut-off" scores, based on many years of experience, for assignment to special sections. In no case, however, is the test score used as the sole criterion for assigning students to a course. Other factors including recency of training in the area, amount of high school study, and the like are taken into consideration in determining the course placement of a student. Every effort is made in placing students in courses and sections to insure (1) that the student is given an opportunity to continue his education at the highest level for which his previous training and capabilities have prepared him and (2) that the student is not placed in a course which would make academic demands upon him which his previous training and capabilities did not prepare him to meet. The following sections report the criteria used in placing students by the several departments.

A. Mathematics

The stanine score on the Duke Mathematics Placement Test is used as the major criterion in assigning students to appropriate mathematics courses. The following criteria will be used beginning in September, 1960:

Mathematics Stanine	
1	no mathematics recommended
2-4	Mathematics 11
5-9	Mathematics 21

B. French

The following criteria are used for French course placement:

French stanine	
1-3	French 1
4-6	French 63
7 (with 2 high school units)	French 63
7 (with 3 high school units)	French 91
8-9	French 91

All students with 4 years of high school French are assigned to French 91.

C. German

The following criteria are used for German course placements:

German stanine	
1-2	German 1
3-6	German 63
7-8	German 64 or 117
9	Third year German course

D. Latin

The following criteria are used for Latin courses placement:

Latin stanine	
1-3	Latin 1
4-5	Latin 63
6-9 (with less than 3 years of high school Latin)	Latin 63
6-9 (with 3 or more years of high school Latin)	Latin 91

E. Spanish

The following criteria are used for Spanish course placement:

Spanish stanine	
1-4	Spanish 1
5-7	Spanish 63
8-9	Spanish 91

All students with 4 years of high school Spanish are assigned to Spanish 91.

F. Education 5

Selection of students for assignment to remedial reading in the

first semester is, in general, based upon the following criteria:

Students with the lowest scores on the reading test are assigned. The number assigned depends upon the teaching facilities.

G. Chemistry

Most Chemistry 1 students are sectioned without regard to test scores. Those with no background in chemistry are placed in a "beginner's" section which has occasional extra class sessions.

Two sections of the best students, however, are selected for advanced work in General Chemistry on the basis of performance on the S. A. T. M and Total S. A. T., on the Duke Mathematics Placement Test, and a Chemistry Placement Test. The last is a special test emphasizing essay-type questions made out by the Chemistry Staff. All potential Chemistry 1 students with secondary school chemistry backgrounds are asked to take the test. At the time it is given, the aim of the advanced sections is explained and information about science background, tentative major, and interest in Chemistry is obtained.

The criteria for selection for the special sections are (a) a stanine of 5 or more on both the Mathematics Placement and the Total S. A. T. (b) a score of 28 or above (out of a maximum possible grade of 48) on the Chemistry Placement Test, and (c) some definite expression of interest. In a few cases the minimum standard on the Mathematics Placement is relaxed if the other test results are good.

V. USING PLACEMENT TESTS IN ACADEMIC COUNSELING

Placement test scores are initially used for assigning students to courses appropriate to their ability and level of training. Subsequently these scores can be helpful to faculty advisors and deans in their academic counseling with students.

Each faculty advisor and dean is furnished with a Student Test Record Card for each of his student advisees which reports both the stanine and raw score for each test. The card also reports in addition to the student's name, the following identification data:

ITEM	CODES	GROUP
College	1	Woman's College
	2	Nurses
	5	Trinity College
	9	Engineers
Status	1	Freshmen
	2	Transfers
	3-4	OSR
	5-6	Specials
	8	Nursing Education
	9	Auditors
Term	1	Summer Session I
	2	Summer Session II
	3	Fall
	4	Spring
Year	6x	Last two digits of year beginning with Summer Session
Language Tests	1	French
	2	German
	3	Spanish
	4	Latin

In discussing the Placement Test scores reported on these cards with the student, it is perhaps best to refer to his performance in terms of the descriptive phrases listed in Table 4. Thus, a superior score (stanine 9) would suggest that the student's ability in the measured trait was clearly above average, while a very low score (stanine 1) represents fairly clear evidence of a handicap in the measured trait. High (stanines 7 and 8) and low (stanines 2 and 3) scores represent respectively some above average or below average ability, but do not clearly represent mastery or limitations markedly different from the average student. Average scores (stanines 4, 5, and 6) suggest normal development---compared to Duke students---of the skill in question.

These scores become meaningful when they are applied to practical program planning situations. While no generalization will fit all students, certain suggestions can be made about the uses of these test scores

in academic counseling which may be helpful with many students.

Students whose general test pattern falls in the 8 or 9 range can be expected, with normal effort, to earn academic averages of the general area of high B's. Students whose general pattern falls in the 6 or 7 range can be expected, with normal effort, to earn general academic averages in the area of high C to B. Students in the 4, 5, and 6 range can be expected to average about C work with normal effort. When students whose general pattern ranges from 4-9 are doing are doing markedly less well than might have been expected, several sources of difficulty may be explored.

(1) The student may not be putting forth the normal effort in his work. Such students should not be labeled lazy, for the label tells us little and provides no basis for remediation. Some effort should be made to ascertain why the student is not working effectively. It may be that the student has never learned how to study. He may be worried about home, financial, or personal problems which keep him from putting forth his best effort. He may have some health problem or emotional disturbance which reduces his effectiveness as a student. Whatever the problem may be, it is important that the student's perception of it, <u>not the advisor's,</u> serve as the basis for whatever help is given the student.

(2) The student may not be performing at the expected level because of motivation incompatible with success at Duke. Such students need help in exploring their motivation patterns and value systems. Best results are obtained when the student takes the lead in such an exploration, with the advisor giving his major attention to trying to understand (but neither approving or disapproving) the student's value system. Rarely is much gained by the advisor's lecturing the student on "what's good for him" or giving him a "fatherly pep talk."

(3) Students with generally high potential may do poorly because of some specific deficiency. A generally able student whose reading level is in the 1-3 stanine will be handicapped in all courses requiring a great amount of reading. Students with special academic limitations should be referred for assistance to the departments concerned.

(4) Some very able students do poorly in class because of lack of challenge in the basic courses. Such students should be encouraged to broaden their educational experiences outside of class.

These and other reasons suggest why some average to superior students fail to live up to their expectations. In many instances, faculty advisors will find ways, drawn from their experiences, of helping such students. In other instances they may wish assistance in counseling such students. The Bureau of Testing and Guidance is available to provide such assistance.

Students whose general pattern of scores range from 1 - 3 present a different kind of problem. Many of these, by sincere effort, strong motivation, and patient plodding will succeed and at a far higher level than might have been predicted. Some may achieve academic success at the expense of health, social development, or emotional stability. Most students, however, with general test patterns of 2-3 and many with patterns in stanine 1 are able, with help, reduced course loads, and a careful selection of courses, to succeed.

Students whose general test pattern is low or whose scores on specific tests are low may require additional diagnosis. Low scores, as suggested above, may result from the influence of apparently unrelated factors, in which case retesting with new but comparable tests would seem to be desirable in order to insure that the original testing is a fair measure of the student's ability. In the event that the second testing confirms the first, more detailed diagnosis aimed at revealing the causes of the inadequacy should be carried out. Retesting and detailed diagnosis can be accomplished at the Bureau of Testing and Guidance.

The following are some specific interpretations which may be made of the specific tests.

A. Quantitative and Verbal Reasoning

The M score of the S. A. T. measures the student's skill in solving problems and mastering academic materials having a mathematical, technical, or scientific frame of reference. Students having high scores in this area may be encouraged to consider training in mathematics, science, engineering, accounting, statistics, and the like. Students whose M scores fall in the "low" or "very low" categories should plan their programs to avoid, as much as possible, these studies.

The V score of the S.A.T. measures the student's skill in verbal reasoning. Students having high scores in this area may be encouraged to consider training in English, the social studies, and related areas. Weakness in this area frequently reflects a limited reading ability.

B. Reading

The total reading score reflects the student's measured skills in vocabulary, reading speed, and level of comprehension. Students scoring in stanines 1 - 3 should be informed of the academic competition they face and should be advised to carry only a limited number of courses with heavy reading assignments. A regular leisure-time reading program in which the student undertakes to read literature which he finds interesting and which is within his grasp will also aid him in developing better reading skills.

Students scoring in the very low grouping in their class should be advised first to have a thorough ocular examination and a general physical examination. If these examinations do not reveal organic bases for the reading handicap, the student should be referred for remedial reading and his academic program should be reduced.

Students scoring in the high and superior categories should be encouraged to utilize this special skill and broaden their experience through a self-directed reading and study program.

C. Mathematics

Skill in computation and mathematical reasoning is essential not only in mathematics courses, but also in sciences, accounting, statistics, and similar courses. Students deficient in this area should avoid programs of study requiring a high degree of mastery of quantitative skills. It is possible for a student to show considerable aptitude for quantitative studies as measured by high scores on the M section of the S.A.T. and still have a low achievement score on the Mathematics Test. This happens when the student's training has been weak in comparison to his general ability to profit by training. In such cases, the student may be encouraged to engage in scientific studies provided he first overcomes his background deficiency in mathematics courses.

VI. FINAL STATEMENT

The Placement Test scores may be helpful in initial rough screening of students if used in conjunction with other educational and personal data. They are likely to be misleading if used as a sole criterion for evaluating a student's achievement or as a basis of program planning. The Bureau of Testing and Guidance will be pleased to assist staff members and students in securing additional data which will be helpful to them in making educational and vocational judgments and decisions. The Bureau personnel is also available to assist University staff members in interpreting and using test data.